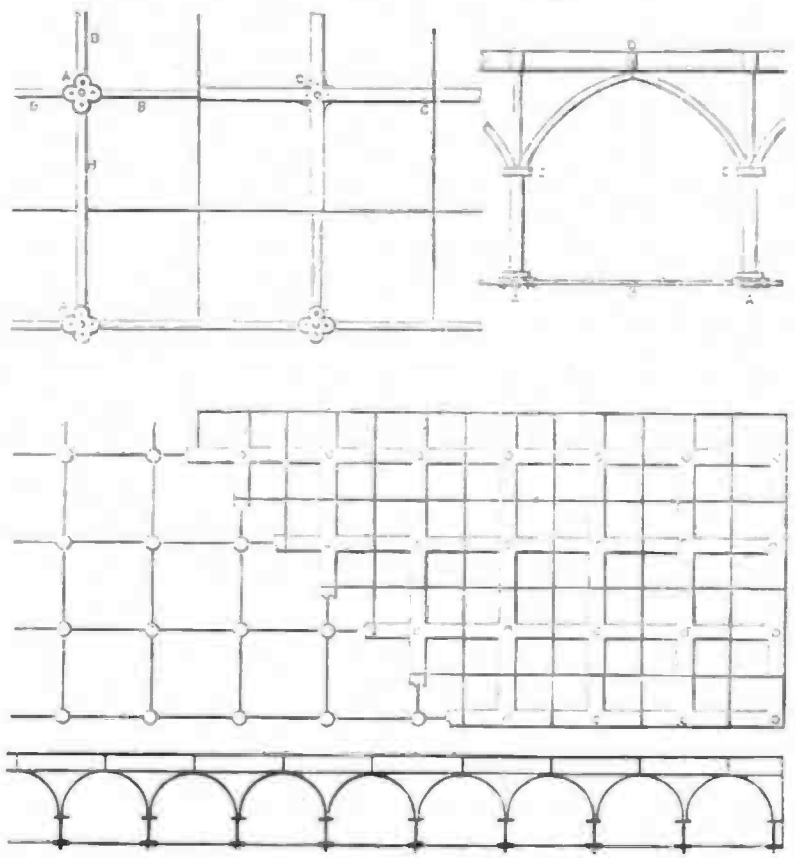
TENSION CHAIN-NET FLOORS AND ROOFS.



TENSION CHAIN-NET FLOORS AND ROOFS FOR SPANS OF 500 FEET.

It has long been a desideratum how to cover in the largest possible space either as a floor or a roof, resting only on the enclosing walls, without intermediate supports in the form of columns, and distributing the strain equally over the whole floor or roof, and also equally over the whole of the supporting walls. In the usual mode of structure for roofs, the principals bear on the walls only at intervals, and thus a small portion has to carry a large load. In floors, large girders are also supported at intervals, and a comparatively small area of wall has to take the whole load. Of the advantages of a clear space without columns, all persons must be aware who may have sat behind one at a lecture or theatre. The structure I am about to describe is very simple, being in truth only a repetition of parts or types, not more than nine in number, including fastenings. The present design shows a span of 200 feet, giving an area of 40,000 square feet, or 400 building squares.

Two short links of the form shown at A A, figs. 1 and 2, are pierced with five holes each, and thus form a pair of jaws, in which are inserted four long links, B, secured by four bolts passing through all three thicknesses.

Over the centre hole is placed a cruciform standard, C C, shaped like a turnstile, and it is fixed by a bolt passing down the centre and through the two short links. The links are ten feet long, and the arms of the standard five feet each way to the centre of the link: each arm is there met by the arm of a similar standard, D. D. figs. 1 and 2, and the two are connected together. As there are twenty links each way to make up the 200 feet, a net is formed of 400 meshes or squares of ten feet each. At every intersection is placed a standard. Thus the net affords a tension strain below, and the standards a compression abutment over the whole surface above. The chains, of course, are of wrought iron, and the standards may be of cast iron, or of wrought iron if preferred. The central links must of course be of greater strength than the external ones. Now, as holes may be broken in a net without destroying the strength of other parts, so the breaking or severance of a number of these links would not cause the roof to fall down so long as material enough were left in the others, and therefore it is a very safe construction. It is also a construction susceptible of considerable elegance and ornament. The chain links may be of flat or round bar, or fluted, or of open work, or ornamented on their mid-length, and the short links and the nuts may also be very ornamental, being manufactured by punching. The standards may be of Gothic or other construction, and are susceptible of many kinds of ornament.

The squares of 10 feet are intersected by one or two intermediates, dividing them into squares of 5 feet, or 3 feet 4 inches. On these squares are laid sheets of thick glass, between dividing ribs, which are cast on the metal and kept below the thickness of the glass. The glass is fixed and rendered water-tight by strips of cork or other elastic medium, and thus the same process that keeps wine in a bottle keeps water out of the building, and is not affected by variation of temperature.

Where the four standard arms meet each other, wedges may be used so as to camber the roof up to any curved form that may be required to throw off water. The glass may be coloured, and thus every required effect may be produced. The glass can, if preferred, be made with edges turned down to clip over the ribs like a hat-box lid: this kind of roof would well suit a greenhouse or would cover in a courtyard, such as the internal courts of the Parliament Houses, or for an Exhibition building, as at Cork. As it would be amply strong to walk over, there would be no difficulty in drawing blinds over it, or in opening or closing the squares of glass. Every square might, if required, be covered with a Gothic lanthorn, or with triangular sheets of glass in a pyramidal form. A very beautiful groined ceiling might be produced in this mode. The mechanical arrangement is also well adapted to railway stations, when a large space is required free from columns. Although this roof is shown flat, it is obvious that the same construction is applicable to an arch or dome roof, in such case each standard serving as a wedge by simply elongating the arms.

When used as a floor, this structure may be covered above with sheets of sawn slate, the edges stopped with cork, as before described, or wood pieces may be inserted between the slates to lay flooring-boards on. Other slates can be laid, if required, on the tops of the tension-rods to form a ceiling, and thus a hollow space, fire-proof, formed for the purposes of warming and ventilation, may be obtained; or by attaching tumblers and laths, or interweaving wirework to the tension-rods, the ordinary plaster ceiling may be produced, either plain or panelled. But the object of the inventor has been to produce a mechanical construction, the arrangement of which, while permitting cheapness and facility of execution, should, while showing the whole of the structure, yet be susceptible of as great a variety of ornament as any class of architecture extant.

The whole of the short and long tension-links are so simple, that any manufacturer may furnish them at a price little above that of merchant-bar. The only requisite is, that the punches be fixed in a tool especially made, in order to insure that all may be exactly alike. The bars may, if required, be rolled with swells round the eyes to diminish the weight of metal. The castings may be in one piece with the column that rests on the chains, or in two pieces. The architect would merely have to furnish the designs for a single casting. The proportion of depth to span would be about one to fifteen or twenty, according to circumstances.

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